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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,479	01/23/2004	Seok-Soon Kim	28946U	4940

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EXAMINER	
HALL, ASHA J	
ART UNIT	PAPER NUMBER
1795	

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05/12/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,479	KIM ET AL.	
	Examiner	Art Unit	
	ASHA HALL	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 15, 2008 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Park et al. (K.W. Park, K.S. Ahn, J.H. Choi, Y.C. Nah, Y.M. Kim, "Pt-WO_x electrode structure for thin-film fuel cells," Applied Physics Letters 81, (2002) 907-909).

As to claim 1, Park et al. disclose a method for fabricating a counter electrode (Pt-WO_x two-phase electrode, paragraph 2) the method comprising: co-sputtering platinum (Pt target material, paragraph 3) and a metal oxide (WO_3 target material, paragraph 3) as target materials onto a substrate (ITO coated transparent glass substrate, paragraph 3) as described in paragraph 3. The process forms a counter electrode (Pt-WO_x nanostructured alloy electrode, paragraph 2) that includes nanocrystalline platinum (nanosized Pt crystalline phase of 4-5 nm shown as the dark

portions of the images in Figure 1 and discussed in paragraph 4). Finally, the method disclosed by Park et al. yields an amorphous metal oxide (amorphous, porous tungsten oxidative phase discussed in paragraph 4 and shown as the "relatively bright region" in the TEM image of the electrode in Figure 1). Park et al. further discloses that the counter electrode has a two-phase structure consisting of Pt metal and a porous/open structure metal oxide (WO_x) such that it is a two phase structure composed of a nano-crystalline and an amorphous phase/non-layered structure (p.908, paragraph 1) as shown in Figure 1. The efficiency of dye-sensitized solar cell comprising the nanocrvstalline platinum-amorphous metal oxide counter electrode as measured by a current-voltage characteristics is a characteristic property of the material. Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

Although the method disclosed in Park et al. is for the fabrication of an electrode for a Thin-film fuel cells and not explicitly for a dye-sensitized solar cell, the method disclosed provides an electrode suitable for the latter device without any modifications whatsoever. This preamble merely recites the purpose of the process and the intended use of the resulting structure, while the body of the claim does not depend on the preamble for completeness and the process steps and structural limitations are able to stand alone (see MPEP 2112.02).

As to claim 2, the metal oxide of Park et al. (i.e., amorphous tungsten oxide) has a refractive index of 2 or higher. This is evidenced by Gogova et al. (D. Gogva, K.

Gesheva, A. Szekeres and M. Sendova-Vassileva, "Structural and Optical Properties of CVD Thin Tungsten Oxide Films, " Physica Status Solidi (a) 176 (2) , (1999) 969 - 984) in Figure 8 (see refractive index for amorphous tungsten oxide unannealed and deposited at 200ºC).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pruneanu et al. (S. Pruneanu, G. Mihailescu, E. Indrea, "Nanoporous Al_2O_3 membranes filled by platinum," Semiconductor Conference 2000, CAS 2000 Proceedings, International 2, (2000) 475-478) in view of Park et al.

As to claims 1, Pruneanu et al. disclose a method for fashioning an Al_2O_3/Pt composite "nanoelectrode" counter electrode for "electronic and photoelectronic devices" such as dye-sensitized solar cells (Introduction, paragraph 1). The method involves depositing the counter electrode/ Pt metal inside nanopores of Al_2O_3 electrochemically which creates nanocrystalline patches/nanoporous membranes/non-layered (p.476, paragraph 3) of Pt metal for the electrode. However, Pruneanu et al. fails to disclose is a technique based on sputtering.

Park et al. disclose a method for fabricating a counter electrode (Pt-WO_x two-phase electrode, paragraph 2) the method comprising: co-sputtering platinum (Pt target material, paragraph 3) and a metal oxide (WO_3 target material, paragraph 3) as target materials onto a substrate (ITO coated transparent glass substrate, paragraph 3) as described in paragraph 3. The process forms a counter electrode (Pt-WO_x nanostructured alloy electrode, paragraph 2) that includes nanocrystalline platinum (nanosized Pt crystalline phase of 4-5 nm shown as the dark portions of the images in Figure 1 and discussed in paragraph 4). Finally, the method disclosed by Park et al. yields an amorphous metal oxide (amorphous, porous tungsten oxidative phase discussed in paragraph 4 and shown as the "relatively bright region" in the TEM image of the electrode in Figure 1). Park et al. explain, in paragraph 1, that such a sputtering process produces electrodes "physical and electrochemical properties" that are superior relative to other techniques. As to the latter, Park et al. specifically mention an "electrochemical deposition" similar to that used by Pruneanu et al. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Pruneanu et al. for creating a Al_2O_3/Pt electrodes by doing the same using the sputtering method of Park et al. in order to improve the physical and electrochemical properties of the electrode.

Although the method disclosed in Park et al. is for the fabrication of an electrode for a thin-film fuel cells and not explicitly for a dye-sensitized solar cell, the method disclosed provides an electrode suitable for the latter device without any modifications whatsoever. In fact, the explicit mention of the use of the method disclosed in the

instant application for a dye-sensitized solar is simply part of the preamble of the claim which is generally not accorded any patentable weight. This preamble merely recites the purpose of the process and the intended use of the resulting structure, while the body of the claim does not depend on the preamble for completeness and the process steps and structural limitations are able to stand alone (see MPEP 2112.02).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. as applied to claim 1 above, in view of Vink et al. (T.J. Vink, W. Walrave, J.L.C. Daams, P.C. Baarslag, J.E.A.M. van den Meerakker, "On the homogeneity of sputter-deposited ITO films Part I. Stress and microstructure," Thin Solid Films 266 (1995) 145-151).

As to claim 4, modified Park et al. discloses the method of claim 1 above, and Park et al. fails to disclose the metal oxide has an electric concentration of 0.1S/m or more.

The metal oxide of Vink et al. has an electrical resistivity of less than 10^{-2} Ω cm (Figure 1), which implies conductivity well in excess of 0.1 S/m. The electric concentration of the metal oxide is a characteristic property of the material. Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

Response to Arguments

Claim Rejection under 35 USC §112

1. Due to Applicant's amendments, the 35 USC § 112 2nd paragraph rejection for claims 1-7 is withdrawn.

Claim Rejection under 35 USC §102

In regard to claim 1, the Applicant argues that the subject matter recited in Applicants' claim 1 is novel over the applied reference of Park, as Park does not disclose or suggest at least the "is at least about 40% more efficient" element and additionally, does not disclose or suggest the features of canceled claim 7, which have been amended into claim 1.

The Examiner respectfully disagrees. The efficiency of dye-sensitized solar cell comprising the nanocrvstalline platinum-amorphous metal oxide counter electrode as measured by a current-voltage characteristics is a characteristic property of the material. Thus the claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).

Claim Rejection under 35 USC §103

As to claim 1, the Applicant argues that Pruneanu does not supply the subject matter lacking in Park and Pruneanu is silent about the materials used, as Pruneanu only discloses the use of A1203. Therefore, Park and Pruneanu, individually or in combination, do not disclose or suggest all the features of Applicants' claimed subject matter.

The Examiner respectfully disagrees. Pruneanu et al. disclose a method for fashioning an Al_2O_3/Pt composite "nanoelectrode" counter electrode for "electronic and photoelectronic devices" such as dye-sensitized solar cells (Introduction, paragraph 1). The method involves depositing the counter electrode/ Pt metal inside nanopores of Al_2O_3 electrochemically which creates nanocrystalline patches/nanoporous membranes/non-layered (p.476, paragraph 3) of Pt metal for the electrode. However, Pruneanu et al. fails to disclose is a technique based on sputtering.

Park et al. disclose a method for fabricating a counter electrode (Pt-WO_x two-phase electrode, paragraph 2) the method comprising: co-sputtering platinum (Pt target material, paragraph 3) and a metal oxide (WO_3 target material, paragraph 3) as target materials onto a substrate (ITO coated transparent glass substrate, paragraph 3) as described in paragraph 3. The process forms a counter electrode (Pt-WO_x nanostructured alloy electrode, paragraph 2) that includes nanocrystalline platinum (nanosized Pt crystalline phase of 4-5 nm shown as the dark portions of the images in Figure 1 and discussed in paragraph 4). Finally, the method disclosed by Park et al. yields an amorphous metal oxide (amorphous, porous tungsten oxidative phase discussed in paragraph 4 and shown as the "relatively bright region" in the TEM image of the electrode in Figure 1). Park et al. explain, in paragraph 1, that such a sputtering process produces electrodes "physical and electrochemical properties" that are superior relative to other techniques. As to the latter, Park et al. specifically mention an "electrochemical deposition" similar to that used by Pruneanu et al.

Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ASHA HALL whose telephone number is (571)272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH

/A. H./
Examiner, Art Unit 1795
/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795